

CLAIMS

We Claim

1. A sensor, comprising a substrate and a membrane connected to said substrate and having a surface where an interaction with a medium occurs in a manner to deflect said membrane relative to said substrate.
2. The sensor of claim 1 wherein said membrane has a convex or concave shape.
3. The sensor of claim 1 wherein said surface has a reaction agent thereon where a reaction with species of an analyte occurs in a manner to deflect said membrane relative to said substrate.
4. The sensor of claim 1 wherein said membrane has a deflectable convex or concave shape.
5. The sensor of claim 1 further including means for detecting deflection of the membrane relative to the substrate.
6. The sensor of claim 2 wherein said means detects a change in capacitance between electrodes associated with said substrate and said membrane by virtue of the deflection of said membrane.
7. The sensor of claim 3 wherein the reaction agent comprises a coating on the surface.
8. The sensor of claim 7 wherein the coating includes reaction molecules.
9. The sensor of claim 7 wherein the molecules provide chemical reaction sites.
10. The sensor of claim 7 wherein the molecules provide biomolecular reaction sites.
11. The sensor of claim 1 wherein the membrane includes an interior surface subjected to gas pressure to impart a convex shape to said surface and an exterior surface having said agent.
12. The sensor of claim 1 wherein the membrane is an elastomeric material
13. The sensor of claim 1 wherein the membrane includes one or more metallic layers imparting a convex or concave shape to said membrane.
14. The sensor of claim 1 wherein the membrane comprises a ceramic material.

15. The sensor of claim 14 wherein the ceramic material comprises silicon oxide or silicon nitride.

16. The sensor of claim 1 wherein the medium comprises an analyte.

17. A sensor, comprising at least one sensor of claim 3 and at least one sensor of claim 1 without the reaction agent.

18. A sensor, comprising a sensor area according to claim 1 and an actuation area in gas flow communication with the sensor area and having an actuation membrane spaced from the substrate by a gas-containing gap and movable in a manner to gas pressurize said sensor area when said actuation membrane is moved toward said substrate.

19. A transducer, comprising a substrate and a membrane peripherally connected to said substrate and being deflectable relative to said substrate.

20. An actuator, comprising a substrate and an actuation membrane spaced from the substrate by a gas-containing gap from said substrate, said actuation membrane being movable toward the substrate to expel gas from the gap.

21. A method of sensing, comprising producing an interaction at a surface of a membrane connected to a substrate, deflecting the membrane when the interaction occurs, and detecting the deflection of the membrane.

22. The method of claim 21 wherein said interaction comprises a chemical and/or biomolecular reaction between an agent on said surface and molecules in an analyte.

23. A method of sensing, comprising producing an interaction at a surface of a membrane connected to a substrate while said membrane is gas pressurized to impart a deflectable shape thereto, deflecting the membrane when the interaction occurs, and detecting the deflection of the membrane.

24. A method of transmitting stress, comprising providing a membrane connected to a substrate with said membrane having a convex or concave shape and inducing surface stress in said membrane in a manner that deflects said membrane relative to said substrate.

25. A method of transmitting stress, comprising providing a flat membrane connected to a substrate and inducing surface stress in said membrane in a manner that deflects said membrane into to a convex or concave shape.

26. A method of generating a flow of gas, comprising moving an actuation membrane spaced from a substrate by a gas-containing gap toward said substrate to expel gas from the gap.

27. A method of forming a membrane having an arcuate shape, comprising heating the membrane to impart an arcuate shape thereto, depositing one more metallic layers on the heated membrane, and cooling the membrane to ambient temperature, the membrane being constrained by the one or more metallic layers in an arcuate shape.